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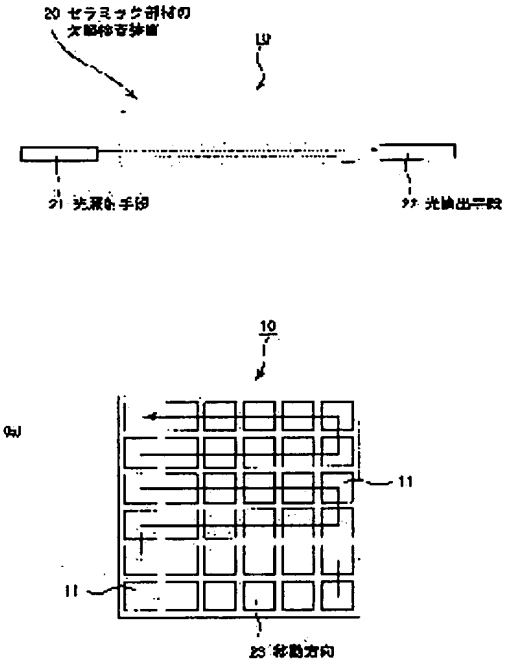
(54) METHOD AND EQUIPMENT FOR INSPECTING DEFECT OF POROUS CERAMIC MEMBER

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a method for inspecting the defect of a porous ceramic member inexpensively and safely with high accuracy and productivity.
SOLUTION: In the method for inspecting a defect existing in a porous ceramic member, the porous ceramic member has a large number of through holes in the longitudinal direction. The porous ceramic member is columnar and the through holes are filled, at one end parts thereof, with a filler in checker pattern. The through holes not filled with the filler at one end part are filled, at the other end parts, thereof, with the filler. Light is radiated from one end of the porous ceramic member so as to be in parallel with the through hole thereof and the light leaking to the other end of the porous ceramic member is detected, thus inspecting the defect of the porous ceramic member.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] It is the defective inspection approach of detecting the defect which exists in a porosity ceramic member. Said porosity ceramic member Many through tubes are installed in the longitudinal direction side by side. The end section of said through tube The checker is filled up with the filler. And the other end It is the porosity ceramic member of the shape of a column with which the filler is filled up into the through tube with which the filler is not filled up into said end section. Detection of the defect of said porosity ceramic member The defective inspection approach of the porosity ceramic member characterized by carrying out by detecting the light which irradiates light from the end of said porosity ceramic member so that it may become parallel to the through tube of said porosity ceramic member, and is revealed to the other end of said porosity ceramic member.
[Claim 2] It is defective test equipment which detects the defect which exists in a porosity ceramic member. Said porosity ceramic member Many through tubes are installed in the longitudinal direction side by side. The end section of said through tube The checker is filled up with the filler. And the other end It is the porosity ceramic member of the shape of a column with which the filler is filled up into the through tube with which the filler is not filled up into said end section. Said defective test equipment The Mitsuteru gunner stage which irradiates light from the end of said porosity ceramic member so that it may become parallel to the through tube of said porosity ceramic member, So that the straight line which connects said Mitsuteru gunner stage and said photodetection means, and said through tube may become parallel about a photodetection means to detect the light revealed to the other end of said porosity ceramic member, and said porosity ceramic member So that light may be irradiated by all the through tubes that contain a **** suggestion **** through tube with said filler from the end section of said porosity ceramic member, after moving said porosity ceramic member between said Mitsuteru gunner stages and said photodetection means Defective test equipment of the porosity ceramic member characterized by having the migration means constituted so that said porosity ceramic member might be moved serially.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the defective inspection approach of the porosity ceramic member for detecting the defect of a porosity ceramic member, and the test equipment used for defective inspection of this porosity ceramic member.
[0002]
[Description of the Prior Art] It poses a problem that the particulate contained in the exhaust gas discharged by internal combustion engines, such as cars, such as a bus and a truck, and a construction equipment, does damage to an environment or the body recently. By passing a porosity ceramic for this exhaust gas, the ceramic filter which carries out uptake of the particulate in exhaust gas, and purifies exhaust gas is proposed variously.
[0003] Two or more porosity ceramic members 30 as shown in drawing 3 band together, and the ceramic filter usually constitutes the ceramic filter 40. Moreover, as this porosity ceramic member 30 is shown in drawing 4 , many through tubes 31 are installed in a longitudinal direction side by side, and the septum 33 which separates through tube 31 comrades functions as a filter.
[0004] Namely, the through tube 31 formed in the porosity ceramic member 30 As shown in drawing 4 (b), the exhaust gas with which either of the edges of the entrance side of exhaust gas or an outlet side flowed into ********** and the through tube 31 of 1 with the filler 32 In case it flows out of other through tubes 31 and exhaust gas passes this septum 33 after passing the septum 33 which surely separates a through tube 31, a particulate is caught in septum 33 part and exhaust gas is purified. If a defect exists in the porosity ceramic member 30 at this time, a particulate cannot pass this defect and cannot fully purify exhaust gas in the ceramic filter using such a porosity ceramic member.
[0005] Therefore, inspection which checks whether such a defect exists in a ceramic filter is needed. However, after manufacturing a ceramic filter, if such inspection is conducted, since there is much time and cost-futility, it will inspect whether a defect exists in the porosity ceramic member 30 in the phase of the porosity ceramic member 30 before manufacturing a ceramic filter. As an approach of checking the existence of such a defect conventionally, the X-ray was irradiated at the porosity ceramic member 30, and the method of checking the existence of a defect from the permeability of this X-ray etc. was used.
[0006] However, since the approach using such an X-ray required costs, the jump of a manufacturing cost was caused, and since it was harmful, the X-ray was a thing accompanied by [to the body] risk to an activity.
[0007] Furthermore, as shown in drawing 5 , the existence of the defect of the porosity ceramic member 30 could be checked from the permeability of this X-ray by irradiating an X-ray from a direction perpendicular to the shaft orientations of the porosity ceramic member 30, but since the thickness which an X-ray penetrates about the defect which exists in the filler 32 neighborhood became thick, it was difficult [it] to check existence of a defect correctly. Moreover, even if it irradiated the X-ray from the shaft orientations of the porosity ceramic member 30, it was difficult to check existence of the defect near a filler correctly similarly.
[0008]
[Problem(s) to be Solved by the Invention] This invention was made in order to solve these problems, and it aims at offering the test equipment used for the defective inspection approach of a porosity ceramic member that it is cheap and the defect of a porosity ceramic member can moreover be safely detected with a sufficient precision, and the inspection approach of the above-mentioned porosity ceramic member.
[0009]

[Means for Solving the Problem] The defective inspection approach of the porosity ceramic member of this invention It is the defective inspection approach of detecting the defect which exists in a porosity ceramic member. The above-mentioned porosity ceramic member Many through tubes are installed in the longitudinal direction side by side. The end section of the above-mentioned through tube The checker is filled up with the filler. And the other end It is the porosity ceramic member of the shape of a column with which the filler is filled up into the through tube with which the filler is not filled up into a top Norikazu edge. Detection of the defect of the above-mentioned porosity ceramic member From the end of the above-mentioned porosity ceramic member, light is irradiated so that it may become parallel to the through tube of the above-mentioned porosity ceramic member, and it is characterized by carrying out by detecting the light revealed to the other end of the above-mentioned porosity ceramic member.
[0010] Moreover, the defective test equipment of the porosity ceramic member of this invention It is defective test equipment which detects the defect which exists in a porosity ceramic member. The above-mentioned porosity ceramic member Many through tubes are installed in the longitudinal direction side by side. The end section of the above-mentioned through tube The checker is filled up with the filler. And the other end It is the porosity ceramic member of the shape of a column with which the filler is filled up into the through tube with which the filler is not filled up into a top Norikazu edge. The above-mentioned defective test equipment The Mitsuteru gunner stage which irradiates light from the end of the above-mentioned porosity ceramic member so that it may become parallel to the through tube of the above-mentioned porosity ceramic member, So that the straight line and the above-mentioned through tube which connect the above-mentioned Mitsuteru gunner stage and the above-mentioned photodetection means may become parallel about a photodetection means to detect the light revealed to the other end of the above-mentioned porosity ceramic member, and the above-mentioned porosity ceramic member So that light may be irradiated by all the through tubes that contain a **** suggestion **** through tube with the above-mentioned filler from the end section of the above-mentioned porosity ceramic member, after moving said porosity ceramic member between the above-mentioned Mitsuteru gunner stage and the above-mentioned photodetection means It is characterized by having the migration means constituted so that the above-mentioned porosity ceramic member might be moved serially.
[0011]
[Embodiment of the Invention] Hereafter, the operation gestalt of the defective inspection approach of the porosity ceramic member of this invention and defective test equipment is explained, referring to a drawing.
[0012] The defective inspection approach of the porosity ceramic member of this invention It is the defective inspection approach of detecting the defect which exists in a porosity ceramic member. The above-mentioned porosity ceramic member Many through tubes are installed in the longitudinal direction side by side. The end section of the above-mentioned through tube The checker is filled up with the filler. And the other end It is the porosity ceramic member of the shape of a column with which the filler is filled up into the through tube with which the filler is not filled up into a top Norikazu edge. Detection of the defect of the above-mentioned porosity ceramic member From the end of the above-mentioned porosity ceramic member, light is irradiated so that it may become parallel to the through tube of the above-mentioned porosity ceramic member, and it is characterized by carrying out by detecting the light revealed to the other end of the above-mentioned porosity ceramic member.
[0013] First, the porosity ceramic member set as the object of inspection by this invention is explained, referring to drawing 1 (a) and (b). Drawing 1 (a) is the perspective view showing one gestalt of the above-mentioned porosity ceramic member, and drawing 1 (b) is the A-A line sectional view of drawing 1 (a).
[0014] As the above-mentioned porosity ceramic member is shown in drawing 1 (a), many through tubes 11 are installed in the longitudinal direction side by side, and, as for the end section of a through tube 11, the checker is filled up with the filler 12, and the other end is the thing of the shape of a column with which the filler 12 is filled up into the through tube 11 with which the filler 12 is not filled up into the end section.
[0015] The septum 13 is formed as the interior of the above-mentioned porosity ceramic member is shown in drawing 1 (b). Therefore, the matter which cannot pass a septum 13 when the matter which flows out of other through tubes 11, and cannot pass the septa 13, such as fine particles, in a gas exists after the gas which flowed into the through tube 11 of 1 passes the septum 13 which surely separates a through tube 11 will be caught in septum 13 part, in case a gas passes this septum 13. Moreover, although the porosity ceramic member 10 shown in drawing 1 (a) is a square pole configuration, the configuration of the porosity ceramic member set as the object of defective inspection may not be limited to a square pole configuration, but may be the triangle pole and a pentagonal prism configuration, and may be a cylindrical shape-like.
[0016] After the porosity ceramic member 10 fabricates this mixed constituent using an extruding press

machine after preparing the mixed constituent of for example, ceramic powder, a binder, and dispersion-medium liquid and fills up a checker with a bulking agent at the through tube of the acquired Plastic solid, it performs desiccation and cleaning and manufactures them by calcinating. It is not limited especially as the above-mentioned ceramic powder, for example, the powder of oxide system ceramics, such as the powder; alumina of non-oxide system ceramics, such as silicon carbide, silicon nitride, alumimium nitride, boron nitride, titanium nitride, and titanium carbide, cordierite, a mullite, a silica, a zirconia, and a titania, etc. can be mentioned. In these, powder, such as silicon carbide which is excellent in thermal resistance, silicon nitride, and alumimium nitride, is desirable.

[0017] Although especially the particle size of these ceramic powder is not limited, what combined the powder 100 weight section which has the mean particle diameter which what has few contraction is desirable, for example, is about 0.3-50 micrometers, and the powder 5 - 65 weight sections which have the mean particle diameter of about 0.1-1.0 micrometers in the next baking process is desirable.

[0018] It is not limited especially as the above-mentioned binder, for example, methyl cellulose, a carboxymethyl cellulose, hydroxyethyl cellulose, a polyethylene glycol, phenol resin, an epoxy resin, etc. can be mentioned. The loadings of the above-mentioned binder usually have desirable 1 - 10 weight section extent to the ceramic powder 100 weight section.

[0019] It is not limited especially as the above-mentioned dispersion-medium liquid, for example, alcohol [, such as an organic solvent; methanol,], such as benzene, water, etc. can be mentioned. Optimum dose combination of the above-mentioned dispersion-medium liquid is carried out so that the viscosity of a mixed constituent may become fixed within the limits. After being mixed by attritor etc., these ceramic powder, a binder, dispersion-medium liquid, etc. are fully kneaded by a kneader etc., and are fed into extrusion-molding equipment.

[0020] Next, it explains, referring to drawing 1 (b) about the defective inspection approach of the porosity ceramic member of this invention. The defective inspection approach of the porosity ceramic member of this invention inspects the existence of a defect 14 by detecting the existence of the light revealed to the other end of the through tube 11, after irradiating light in the direction parallel to a through tube 11 from the end section of a through tube 11.

[0021] That is, when a defect 14 exists between a filler 12 or a filler 12, and a septum 13 etc., the light irradiated from the end section of a through tube 11 reaches the other end of a through tube 11, after passing a defect 14 (optical path alpha). Therefore, a defect 14 is detectable by detecting the existence of this reaching light.

[0022] On the other hand, when a defect 14 does not exist between a filler 12 or a filler 12, and a septum 13 etc., the light irradiated from the end section of a through tube 11 cannot pass a filler 12, therefore light is not detected by the other end of a through tube 11 (optical path beta). Therefore, it turns out that a defect 14 does not exist in the porosity ceramic member 10 by which light is not detected by the other end of a through tube 11. By enforcing the above-mentioned defective inspection approach, it can inspect whether a defect 14 exists in the porosity ceramic member 10.

[0023] Although not limited especially as a class of light to irradiate, it is desirable that it is a visible ray. Moreover, this light may be the white light or may be the homogeneous light. It is because the existence of leakage of light can be observed visually, and is because such light penetrates neither the porosity ceramic member 10 nor a filler 12.

[0024] Thus, by whether the light irradiated from the end section of a through tube was revealed to the other end of the through tube, the defective inspection approach of this invention can be cheap, and, moreover, can distinguish the existence of a defect correctly safely compared with the approach of distinguishing the existence of a defect by X-ray irradiation, in order to distinguish the existence of the existence of a defect, and, unlike destructive inspection, can carry out total inspection.

[0025] Next, the defective test equipment of the porosity ceramic member of this invention is explained, referring to drawing 2 . The defective test equipment of the porosity ceramic member of this invention It is defective test equipment which detects the defect which exists in a porosity ceramic member. The above-mentioned porosity ceramic member Many through tubes are installed in the longitudinal direction side by side. The end section of the above-mentioned through tube The checker is filled up with the filler. And the other end It is the porosity ceramic member of the shape of a column with which the filler is filled up into the through tube with which the filler is not filled up into a top Norikazu edge. The above-mentioned defective test equipment The Mitsuteru gunner stage which irradiates light from the end of the above-mentioned porosity ceramic member so that it may become parallel to the through tube of the above-mentioned porosity ceramic member, So that the straight line and the above-mentioned through tube which

connect the above-mentioned Mitsuteru gunner stage and the above-mentioned photodetection means may become parallel about a photodetection means to detect the light revealed to the other end of the above-mentioned porosity ceramic member, and the above-mentioned porosity ceramic member So that light may be irradiated by all the through tubes that contain a **** suggestion **** through tube with the above-mentioned filler from the end section of the above-mentioned porosity ceramic member, after moving said porosity ceramic member between the above-mentioned Mitsuteru gunner stage and the above-mentioned photodetection means It is characterized by having the migration means constituted so that the above-mentioned porosity ceramic member might be moved serially.

[0026] Drawing 2 (a) is the top view having shown typically some defective test equipment of the porosity ceramic member of this invention, and (b) is the front view having shown the direction to which a porosity ceramic member moves. The defect of the porosity ceramic member set as the object of inspection in the defective test equipment of the porosity ceramic member of this invention is the same as that of what was explained in the defective inspection approach of the porosity ceramic member of above-mentioned this invention.

[0027] As shown in drawing 2 (a), although the defective test equipment 20 of the porosity ceramic member of this invention does not carry out the Mitsuteru gunner stage 21 which irradiates light, a photodetection means 22 to detect light, and illustration, it is equipped with a migration means to move the porosity ceramic member 10 to a position.

[0028] Here, the porosity ceramic member 10 is the same as the porosity ceramic member 10 explained by the defective inspection approach of the above-mentioned porosity ceramic member.

[0029] Especially if light can be irradiated in parallel with the through tube of the porosity ceramic member 10 as a Mitsuteru gunner stage 21, it will not be limited, for example, means of arbitration, such as irradiation equipment using an electric bulb etc., a searchlight, light emitting diode, and laser, can be mentioned. Moreover, as for the light irradiated, it is desirable that it is a visible ray. It is based on the reason indicated by the defective inspection approach of a porosity ceramic member, and the same reason.

[0030] Moreover, although the means of arbitration can be mentioned as a photodetection means 22 if light is detectable, it is desirable to use a CCD camera. While being able to check leakage of light easily visually by connecting a CCD camera and a display with wiring, it is because the check of whether the porosity ceramic member 10 is in a position can also be carried out. Moreover, if light carries out incidence to a CCD camera, since a current will get off, it can judge automatically whether light was revealed or not by detecting this current and inputting into a computer etc.

[0031] Moreover, this Mitsuteru gunner stage 21 and the photodetection means 22 are being fixed on the same line. It is because the photodetection means 22 detects the existence of leakage of the light irradiated in parallel with the through tube of the porosity ceramic member 10 from the Mitsuteru gunner stage 21.

[0032] It cannot be limited especially as the above-mentioned migration means, for example, the porosity ceramic member 10 can be supported with a robot arm etc., and it can be made to move. Moreover, after moving the through tube of 1 of the porosity ceramic member 10 on the straight line which the Mitsuteru gunner stage 21 and the photodetection means 22 form, this migration means is constituted so that it may move serially about all the through tubes of the porosity ceramic member 10 which contains a **** suggestion **** through tube with a filler. Here, although the crooked arrow head shows the migration direction 23 of the porosity ceramic member 10 to drawing 2 (b), with the defective test equipment of the porosity ceramic member of this invention, the migration direction of a porosity ceramic member is not limited to this, and can mention the direction and the migration direction of spiral ** which rotated the 90 degrees of the migration directions 23 of drawing 2 (b).

[0033] Next, the defective inspection approach which used the defective test equipment of the porosity ceramic member of this invention is explained. First, the porosity ceramic member which filled up with and calcinated the filler is manufactured. Next, after supporting this porosity ceramic member with a robot arm etc. and fixing, it is made to move onto the straight line which the Mitsuteru gunner stage and a photodetection means form.

[0034] At this time, the above-mentioned porosity ceramic member is moved so that the light which the above-mentioned Mitsuteru gunner stage irradiates may be irradiated in parallel with the through tube of 1 of the above-mentioned porosity ceramic member. Moreover, as for the through tube of the above 1, it is desirable that it is the gap or the through tube of 1 formed in the four corners of a porosity ceramic member. It is because the migration direction at the time of moving a porosity ceramic member can be made simple.

[0035] After moving a porosity ceramic member to a position, laser etc. is irradiated from the Mitsuteru gunner stage at the through tube of a porosity ceramic member, and parallel. And the existence of the light

which photodetection means, such as a CCD camera, reveal is detected. Here, if leakage of light is not checked, a porosity ceramic member is moved so that the following through tube may come on the straight line which the Mitsuteru gunner stage and a photodetection means form, and same inspection is conducted. The existence of the defect of a porosity ceramic member is inspected by conducting same inspection serially about all the through tubes that contain a **** suggestion **** through tube with a filler.

[0036] Moreover, if leakage of light is detected by photodetection means, such as a CCD camera, the above-mentioned robot arm etc. will use a porosity ceramic member as a defective article at the time, and it will take out from a production line soon. After inspecting about all the through tubes, you may set up so that a porosity ceramic member may be calculated, but since there is much time futility, when leakage of light is checked in this case, it is desirable to be set up so that it may take out soon.

[0037] Such a series of inspection processes are performed controlling by the control means of a computer etc. automatically. That is, it connects with each means, such as the Mitsuteru gunner stage, a photodetection means, and a migration means, and the control means of the above-mentioned computer etc. performs automatically each control of migration of a porosity ceramic member, the exposure of light, the check of leakage of light, the ejection of a porosity ceramic member, etc. Moreover, each inspection process can be checked now by viewing by connecting display means, such as a display, with a photodetection means through the above-mentioned control means directly.

[0038] While, being able to conduct defective inspection of a porosity ceramic member correctly quick moreover by controlling the defective test equipment of the porosity ceramic member of this invention by the control means of a computer etc., an inspection situation can be visually checked in detail by establishing display means, such as a display.

[0039] Thus, since the light irradiated from the end section of a through tube distinguishes the existence of the defect of a porosity ceramic member by whether it revealed to the other end of the through tube, compared with the approach of distinguishing a defect by X-ray irradiation, the defective test equipment of the porosity ceramic member of this invention is cheap, and, moreover, can distinguish the existence of a defect correctly safely. Moreover, unlike destructive inspection, total inspection can be conducted. Moreover, since it can distinguish from a defect shortly after detecting the light to reveal, productivity is high.

[0040]

[Example] Although an example is hung up over below and this invention is explained to it in more detail, this invention is not limited only to these examples.

[0041] An average pore diameter as shown in drawing 1 is 2 1cm at 5-20 micrometers by performing extrusion molding, and producing the Plastic solid of a honeycomb configuration, then performing desiccation, cleaning, and baking, after adding and kneading an organic binder, water, etc. to example 1 silicon-carbide powder. By 31 pieces, the number of cels of a hit produced the porosity ceramic member whose thickness of a septum is 0.3mm.

[0042] Next, the existence of a defect was inspected about the obtained porosity ceramic member using the defective test equipment 20 of the porosity ceramic member shown in drawing 2 , and it classified to the porosity ceramic member with a defect, and the porosity ceramic member without a defect.

[0043] Next, near the filler of each porosity ceramic member was cut to the shaft orientations and the perpendicular direction of a porosity ceramic member, and the existence of a defect was checked visually.

[0044] Consequently, in the porosity ceramic member by which the defect was detected with the defective test equipment 20 of the porosity ceramic member of this invention, the defect was checked between the filler and the septum, and, on the other hand, the defect was not checked by the porosity ceramic member by which a defect was not detected.

[0045]

[Effect of the Invention] Since the defective inspection approach of the porosity ceramic member of this invention is as above-mentioned, it is cheap in the defect of a porosity ceramic member, and moreover, it can detect with a sufficient precision safely, and its productivity is high.

[0046] Moreover, since the defective test equipment of the porosity ceramic member of this invention is as above-mentioned, by using this test equipment, it is cheap and can detect the defect of a porosity ceramic member with a sufficient precision for high productivity safely.

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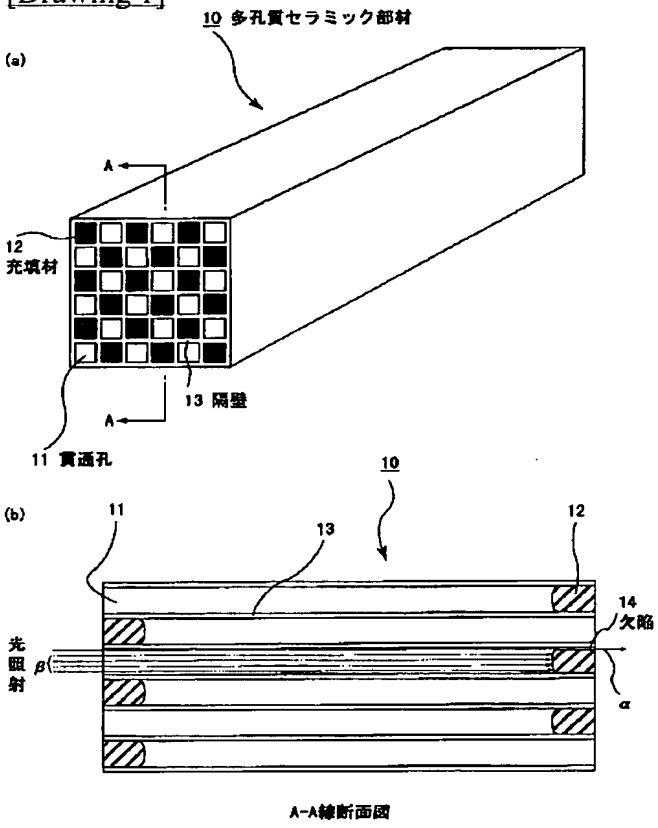
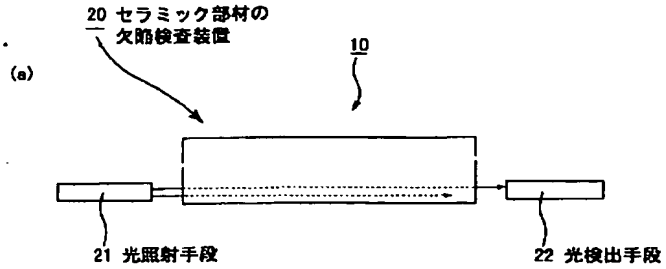
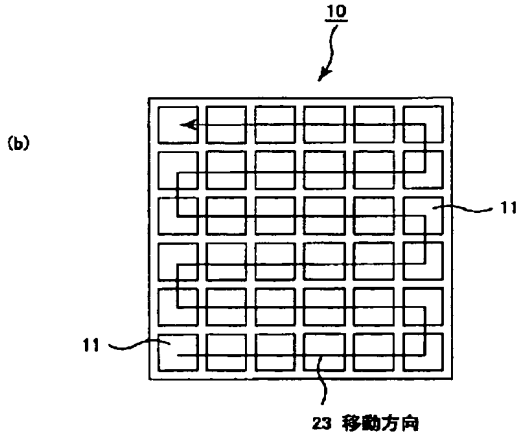
DRAWINGS

[Drawing 1]

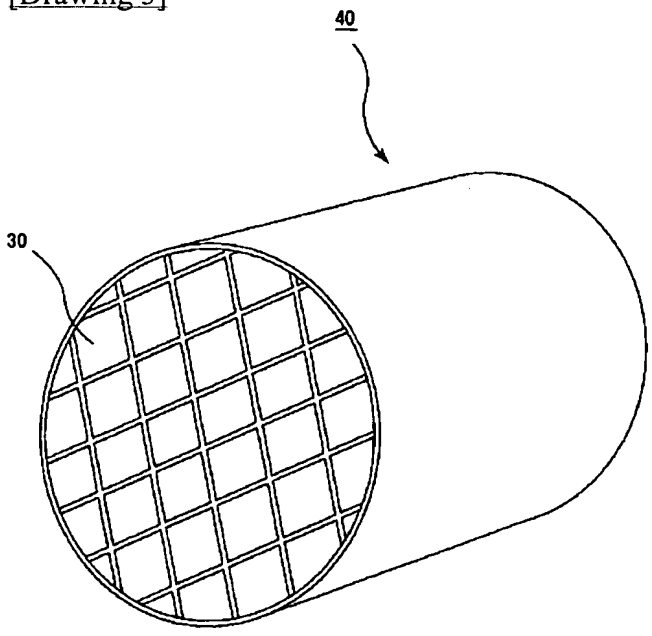


[Drawing 2]

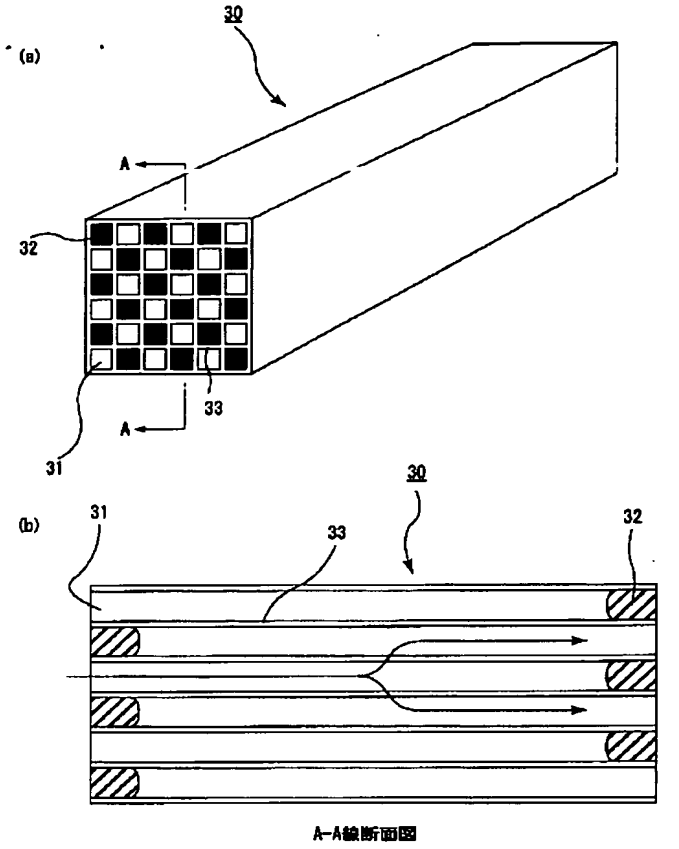




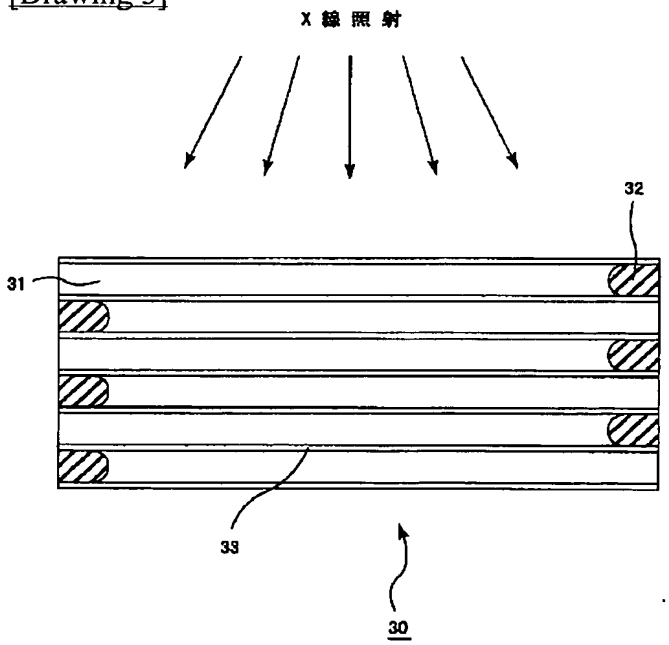
[Drawing 3]



[Drawing 4]



[Drawing 5]



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CORRECTION OR AMENDMENT

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G01N 21/95

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[Procedure revision]
[Filing Date] April 19, Heisei 17 (2005. 4.19)
[Procedure amendment 1]
[Document to be Amended] Specification
[Item(s) to be Amended] The name of invention
[Method of Amendment] Modification
[The contents of amendment]
[Title of the Invention] The defective inspection approach of a porosity ceramic member, the manufacture approach of a porosity ceramic member, and defective test equipment of a porosity ceramic member
[Procedure amendment 2]
[Document to be Amended] Specification
[Item(s) to be Amended] Claim
[Method of Amendment] Modification
[The contents of amendment]
[Claim(s)]
[Claim 1]
It is the defective inspection approach of detecting the defect which exists in a porosity ceramic member. Said porosity ceramic member Many through tubes are installed in the longitudinal direction side by side. The end section of said through tube The checker is filled up with the filler. And the other end It is the porosity ceramic member of the shape of a column with which the filler is filled up into the through tube with which the filler is not filled up into said end section. Detection of the defect of said porosity ceramic member The defective inspection approach of the porosity ceramic member characterized by carrying out by detecting the light which irradiates light from the end of said porosity ceramic member so that it may become parallel to the through tube of said porosity ceramic member, and is revealed to the other end of said porosity ceramic member.
[Claim 2]
Many through tubes are installed in a longitudinal direction side by side, and a checker is filled up with a filler at the end section of said through tube. To the other end After calcinating the Plastic solid with which the through tube with which the filler is not filled up into said end section was filled up with the filler and manufacturing a porosity ceramic member, The manufacture approach of the porosity ceramic member

characterized by using as a product the porosity ceramic member by which light was irradiated from the end of this porosity ceramic member so that it might become parallel to said through tube, the light revealed from the other end was detected, defective inspection was conducted and a defect was not detected.
[Claim 3]
A porosity ceramic member is the manufacture approach of the porosity ceramic member according to claim 2 characterized by functioning as a ceramic filter.
[Claim 4]
Defective test equipment which is characterized by providing the following and which detects the defect which exists in a porosity ceramic member As for said porosity ceramic member, many through tubes are installed in the longitudinal direction side by side. The end section of said through tube The checker is filled up with the filler. And the other end It is the Mitsuteru gunner stage where the through tube with which the filler is not filled up into said end section is filled up with the filler and which irradiates light so that it may be a porosity ceramic column-like member and said defective test equipment may become parallel to the through tube of the end of said porosity ceramic member to said porosity ceramic member. A photodetection means to detect the light revealed to the other end of said porosity ceramic member It is a **** suggestion **** through tube with the end section of a said porosity [after moving said porosity ceramic member between said Mitsuteru gunner stages and said photodetection means so that the straight line which connects said Mitsuteru gunner stage and said photodetection means, and said through tube may become parallel about said porosity ceramic member] ceramic member to said filler.
[Procedure amendment 3]
[Document to be Amended] Specification
[Item(s) to be Amended] 0001
[Method of Amendment] Modification
[The contents of amendment]
[0001]
[Field of the Invention]
This invention relates to the test equipment used for the defective inspection approach of the porosity ceramic member for detecting the defect of a porosity ceramic member, the manufacture approach of a porosity ceramic member, and defective inspection of this porosity ceramic member.
[Procedure amendment 4]
[Document to be Amended] Specification
[Item(s) to be Amended] 0008
[Method of Amendment] Modification
[The contents of amendment]
[0008]
[Problem(s) to be Solved by the Invention]
This invention was made in order to solve these problems, and it aims at offering the test equipment used for the manufacture approach of the porosity ceramic member using the defective inspection approach of a porosity ceramic member that it is cheap and the defect of a porosity ceramic member can moreover be safely detected with a sufficient precision, and this defective inspection approach, and the inspection approach of the above-mentioned porosity ceramic member.
[Procedure amendment 5]
[Document to be Amended] Specification
[Item(s) to be Amended] 0009
[Method of Amendment] Modification
[The contents of amendment]
[0009]
[Means for Solving the Problem]
The defective inspection approach of the porosity ceramic member of this invention It is the defective inspection approach of detecting the defect which exists in a porosity ceramic member. The above-mentioned porosity ceramic member Many through tubes are installed in the longitudinal direction side by side. The end section of the above-mentioned through tube The checker is filled up with the filler. And the other end It is the porosity ceramic member of the shape of a column with which the filler is filled up into the through tube with which the filler is not filled up into a top Norikazu edge. Detection of the defect of the above-mentioned porosity ceramic member From the end of the above-mentioned porosity ceramic member, light is irradiated so that it may become parallel to the through tube of the above-mentioned porosity

ceramic member, and it is characterized by carrying out by detecting the light revealed to the other end of the above-mentioned porosity ceramic member.
Moreover, the manufacture approach of the porosity ceramic member of this invention Many through tubes are installed in a longitudinal direction side by side, and a checker is filled up with a filler at the end section of the above-mentioned through tube. To the other end After calcinating the Plastic solid with which the through tube with which the filler is not filled up into a top Norikazu edge was filled up with the filler and manufacturing a porosity ceramic member, From the end of this porosity ceramic member, light is irradiated so that it may become parallel to the above-mentioned through tube, the light revealed from the other end is detected, defective inspection is conducted, and it is characterized by using as a product the porosity ceramic member by which a defect was not detected.

[Translation done.]